ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Preparation for International	)	IC Docket No. 94-31
Telecommunication Union World	)	
Radiocommunication Conferences	)	

COMMENTS OF TELEDESIC CORPORATION

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SUMMARY

Teledesic Corporation ("Teledesic"), respectfully submits comments in the above-captioned proceeding. In the Second Notice of Inquiry ("Second NOI"), the FCC seeks comment on its preliminary proposals for the 1995 World Radiocommunication Conference ("WRC-95") and future World Radiocommunication Conferences ("WRCs") including the 1997 World Radiocommunication Conference ("WRC-97").

It is essential that the United States adopt a position at WRC-95 for the allocation of spectrum in the 17.7 - 20.2 GHz and 27.5 - 30.0 Ghz bands (collectively, the "Ka band") for mobile satellite service ("MSS") feeder links that will accommodate all proposed non-GSO satellite systems in the Ka band. If sufficient spectrum in the Ka band is not allocated at WRC-95 to accommodate the requirements of Teledesic and the MSS feeder links of the other non-GSO satellite systems proposed in the Ka band, the random deployment of GSO satellite networks between now and WRC-97 will effectively preclude the ability of the United States at future WRCs to establish an adequate allocation of spectrum at the Ka band on a primary basis for non-GSO satellite networks.

- The regulatory structure governing satellite communications has evolved to fit the characteristics of GSO satellites.
- GSO and non-GSO satellite systems have fundamentally different system characteristics which need to be accommodated through different regulatory structures.
- The general incompatibility of the methods by which GSO and non-GSO systems share the same frequencies has resulted in RR 2613 which places non-GSO satellite systems, including MSS feeder link networks, at a decided disadvantage.
- Conceptually, consideration of spectrum allocation issues has been confused by the distinction in the International Table of Frequency Allocations between different *service* types rather than different *system* types.
- The FSS/MSS distinction is not meaningful in the case of non-GSO satellite systems where the space segment is in motion and the notion of orbital arc separation is irrelevant.

- Action is required at WRC-95 to accommodate MSS feeder links because they are non-GSO systems not because they are MSS systems. Both MSS and FSS allocations already exist in the Ka band. What does not exist is an allocation of spectrum at the Ka band for the operation of non-GSO satellite networks on a primary basis.

- The solution to the incompatibility problem is to leave the existing GSO satellite regulatory regime in place in bands where GSO satellite systems will be accorded primary status, and allocate separate bands where non-GSO systems will be treated as primary.

- RR 2613 would not be applied to the frequencies designated for non-GSO satellite networks at the Ka band. New GSO satellite systems would be prohibited from interferring with non-GSO satellite networks in the Ka band and would not be entitled to claim protection from interference from the non-GSO systems.

- Before formulating a position at WRC-95, the FCC must ascertain the spectrum requirements necessary to accommmodate all non-GSO systems proposed at the Ka band.

- Unless the FCC has sufficient information to conclude that sharing is possible among the three MSS feeder links uses proposed at the Ka band, the FCC must assume that full sharing is not possible and seek at WRC-95 the minimum 1000 MHz Ka band allocation (in each direction) necessary to accommodate all non-GSO MSS feeder link use proposed in the Ka band.

- If the FCC determines that all three non-GSO systems can share with each other in the Ka band, then the United States should reduce its minimum Ka band spectrum allocation request to 500 MHz (in each direction).

If, despite the United States' best efforts, an adequate non-GSO allocation is not accomplished at WRC-95, an item should be added to the WRC-97 Agenda to consider the allocation on a primary basis of sufficient spectrum in the Ka band for non-GSO satellite networks.

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To: The Commission

Teledesic Corporation ("Teledesic"), by its attorneys, pursuant to Sections 1.430 and 1.415 of the rules and regulations of the Federal Communications Commission ("FCC" or "Commission"), 47 C.F.R. §§ 1.430 and 1.415, respectfully submits comments in the above-captioned proceeding. In the Second Notice of Inquiry ("Second NOI"), FCC No. 95-36, IC Docket No. 94-31, 60 Fed. Reg. 8994 (1995), the FCC seeks comment on its preliminary proposals for the 1995 World Radiocommunication Conference ("WRC-95") and future World Radiocommunication Conferences ("WRCs") including the 1997 World Radiocommunication Conference ("WRC-97").

As the FCC recognizes, the regulatory issues associated with global non-GSO satellite systems dominate the agenda for WRC-95. Second NOI, at 5. The primary agenda item for WRC-95, as resolved at the 1993 WRC, is to "consider allocations and regulatory aspects for feeder links for the mobile-satellite services." See 1995 WRC Agenda. At WRC-95, a portion of the Ka band will be considered for allocation for Mobile Satellite Service ("MSS") feeder link use. As the FCC has recognized, at WRC-95 the United States will have the opportunity to eliminate technical, operational and regulatory barriers governing the use of

non-geostationary ("non-GSO") satellite systems providing MSS by making available adequate, useable feeder link spectrum to support MSS service links and by adopting limited new allocations. Second NOI at 5. In this respect, the FCC seeks comment on regulatory provisions, spectrum requirements, and spectrum allocations for MSS feeder links. See Second NOI, at 19-31. The Commission is soliciting comment on accommodating MSS feeder links in spectrum allocated to the Fixed Satellite Service ("FSS") as well as on proposals to modify Radio Regulation 2613 ("RR 2613") to eliminate the disadvantage placed on non-GSO FSS and MSS systems by the current interpretation of RR 2613. Id. at 19.

As Teledesic's Comments herein demonstrate, it is essential that the United States adopt a position at WRC-95 for the allocation of spectrum in the 17.7 - 20.2 GHz and 27.5 - 30.0 GHz bands (collectively, the "Ka band") for MSS feeder links that will accommodate all proposed non-GSO satellite systems in the Ka band. The best way to accomplish this objective is by a separate allocation of Ka band spectrum on a primary basis for non-GSO satellite systems. Presently, only three non-GSO satellite systems, those proposed by Teledesic, Motorola Satellite Communications, Inc. ("Motorola") and TRW, Inc. ("TRW") have applied for spectrum in the Ka band. Unless the FCC has sufficient information to conclude that sharing is possible among the three non-GSO MSS feeder links uses proposed in the Ka band, the FCC must assume that full sharing is not possible and seek at WRC-95 the minimum 1000 MHz Ka band allocation (in each direction) necessary to accommodate all non-GSO MSS feeder link use proposed in the Ka band.

I. THE UNITED STATES PROPOSAL AT WRC-95 FOR THE ALLOCATION AND REGULATION OF MSS FEEDER LINKS MUST INCLUDE TELEDESIC'S SPECTRUM REQUIREMENTS

The agenda item for WRC-95 calling for an allocation of spectrum that can accommodate MSS feeder links specifies that "due regard" must be given "to existing services to which the frequency spectrum to be considered by the Conference is also allocated." ITU, Res. 1, Agenda for the 1995 World Radiocommunication Conference (1994) ("1995 WRC Agenda"). Teledesic has on file with the FCC an application for a non-GSO global broadband satellite network in the Ka band. Teledesic's non-GSO satellite network has both FSS and MSS service links, and MSS feeder links.[1] Because any action at WRC-95 on the allocation of spectrum in the Ka band will directly impact Teledesic's plan to provide MSS and FSS services globally using the Ka band, Teledesic has a direct stake in the resolution of the MSS feeder link allocation issue at WRC-95.

Teledesic's requirements must be integrated into the United States position at WRC-95 for several reasons. First, Teledesic is proposing to provide FSS, an existing and authorized service in the Ka band. As indicated above, given the clear cut mandate in the WRC-95 agenda to take "other authorized uses of the band" into account in resolving the MSS feeder link allocation issue, it is clear that Teledesic's spectrum requirements in the Ka band must be accommodated in any WRC-95 action on MSS feeder link spectrum. Second, Teledesic proposes MSS feeder link use and its requirements must be accommodated on the same basis as those of other United States companies seeking spectrum at the Ka band for their MSS feeder links. If the FCC and the United States were to advance a proposal at WRC-95 for a

[1] It is important to note that non-GSO satellite systems providing FSS also will be interconnected with the public switched network.

MSS feeder link allocation that would be inadequate to accommodate one MSS feeder link proponent while accommodating all other proponents, its action would be arbitrary and discriminatory. Equally important, such an action effectively would prejudge the outcome of pending domestic proceedings involving the licensing of the Ka band to various satellite proponents. The FCC will not be able to fulfill its mandate at WRC-95 to accommodate MSS feeder links without incorporating Teledesic's spectrum requirements into the United States position because the MSS capacity of the Teledesic network is larger than the MSS capacity provided by all of the Big LEO (as defined herein) applicants combined.

II. THE OPTIMAL UNITED STATES PROPOSAL TO ACCOMMODATE THE REQUIREMENTS OF MSS FEEDER LINKS SHOULD BE A PRIMARY NON-GSO SATELLITE ALLOCATION

A. The Evolution of Satellite Communications

For more than three decades, geostationary ("GSO") satellites have been virtually the exclusive means of providing space-based communications. The GSO Earth-orbit has some major drawbacks, however, not the least of which is the inverse square law for signal power. Signals in space attenuate in proportion to the square of the distance they travel. This means that communications with satellites 36,000 kilometers away require large antenna dishes and high transmission power. And, even at the speed of light, a round-trip communication through a GSO satellite entails a minimum transmission delay of approximately half a second. These drawbacks have been tolerated because satellite technology did not practically admit to any other approach. But that is rapidly changing.

In recent years, a number of major non-GSO satellite systems have been proposed to meet a range of service needs. These include proposals for low-Earth orbit ("LEO") satellite

systems put forth by Motorola, Loral Qualcomm Space Systems, Inc. ("Loral"), Constellation Communications, Inc. ("Constellation"), AMSC Subsidiary Corporation ("AMSC") and Ellipsat Corporation ("Ellipsat"), as well as the intermediate Earth-orbit satellite systems advanced by TRW and Inmarsat (collectively, the systems proposed by Motorola, Loral, Constellation, AMSC, Ellipsat and TRW referred to as the "Big LEOs"). These systems propose to use multiple satellites to provide premium priced, mobile voice service, extending the range of terrestrial cellular phone networks for users with global roaming needs.

Teledesic's proposed global broadband LEO satellite system will use several hundred satellites to provide broadband channels supporting videoconferencing, interactive multimedia and real-time, digital network connections with a service cost comparable to urban wireline networks. In the case of Teledesic, LEO satellites enable the low-delay required to provide "fiber-like" interconnection with the terrestrial broadband networks. Traditional GSO satellites are inherently incapable of providing the low latency required for seamless compatibility with fiber-based networks on the ground. The low altitude also enables the use of small antennas and compact electronics.

These non-GSO satellite systems are not an aberrational phenomenon. Rather, they reflect a fundamental evolution in satellite-based communications networks. Just as networks on the ground have evolved from centralized systems, built around a single, powerful mainframe computer, to decentralized networks of interconnected PCs, so too are satellite networks evolving from centralized systems, consisting of a single, powerful GSO satellite, to decentralized networks of interconnected LEO satellites. Many of the same technological developments underlie both trends. GSO satellites will continue to play an important role in

space-based communications, particularly for broadcast applications where their large "footprints" are advantageous. However, increasingly, they will share the field with non-GSO satellite systems.

Because non-GSO satellites move in relation to the Earth's surface, to provide continuous coverage of any given point on Earth requires, essentially, global coverage. Thus, these global systems have the inherent capability to offer the same quality and quantity of capacity to users in the developing world as they do to users in the most advanced markets. In this sense, non-GSO satellite systems are a fundamentally egalitarian technology that promises to radically transform the economics of telecommunications infrastructure.[2] Because non-GSO satellite systems are inherently global, they will provide service to all areas of the world, including those places to which no one would extend service for its own sake. The "externalities" of these systems offer the potential for vast humanitarian benefit to those parts of the world most at risk of being left behind by the Information Revolution.

While the global nature of non-GSO satellite systems offers vast humanitarian benefit to all the world, it also poses unique challenges to the international regulatory structure governing space-based communications. Global satellite systems require global satellite spectrum allocations. And because GSO systems and non-GSO systems have fundamentally different system characteristics, different spectrum allocations and coordination procedures are required for each. Satellite technology is changing rapidly, and the international regulatory structure applicable to its deployment must adapt as well.

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[2] While GSO satellite systems also can provide service at a cost indifferent to location, their capacity can be and increasingly is focused through high-power spot beams on the most lucrative service areas. Also, GSO satellites do not provide uniform coverage; service suffers in extreme latitudes. By contrast, non-GSO satellite systems are inherently global and have much more uniform coverage patterns than GSO satellites.

B. In Order to Accommodate MSS Feeder Links, the Regulatory Structure Must Take Into Account The Significant Distinctions Between GSO and Non-GSO Satellite Systems

The regulatory structure governing satellite communications has evolved to fit the characteristics of GSO satellites, which until recently was for all practical purposes the entire universe. The particular attributes of that structure evolved for good reasons to serve important purposes. As applied to GSO satellites, this structure has worked reasonably well. As non-GSO satellite systems have emerged, there has been a good-faith effort to accommodate those systems within the existing regulatory structure. That response has been essentially *ad hoc*, as the non-GSO satellite systems are still generally viewed as a special case rather than an emerging trend. Discussion of changes to the existing structure to accommodate non-GSO satellite systems quite understandably meets resistance -- if the existing structure is optimized for GSO systems, which still constitute the overwhelming majority of operating systems, then changes to that structure may be less than optimal for those GSO systems.

GSO and non-GSO satellite systems have fundamentally different system characteristics which need to be accommodated through different regulatory structures. For example, GSO satellite systems can share the same frequencies through orbital arc separation; GSO satellites in the FSS generally can share the same frequencies with two degree separation between satellites in the GSO orbital plane. Non-GSO satellite systems, however, cannot share frequencies in this manner. The whole concept of orbital arc separation is meaningless to a non-GSO satellite system, whose space segment is in constant motion relative to the Earth and other systems. This would suggest that these systems are less efficient than GSO

satellites in their use of spectrum. In fact, non-GSO satellites can enable greater spectrum efficiency because they are closer to Earth and thus have a smaller footprint within which frequencies can be reused. Whereas a number of GSO satellite systems can operate over a wide band of spectrum with each assigned its own geographic "slot," non-GSO systems can co-exist with each other through band segmentation, with each system assigned its own slice of spectrum.[3] Each method conforms to the essential characteristics of the system to which it applies. However, the two methods cannot be combined.

The general incompatibility of the methods by which GSO and non-GSO systems share the same frequencies has resulted in RR 2613, which effectively requires that non-GSO systems cease transmitting whenever they would interfere with a GSO satellite. RR 2613 seeks to protect GSO satellites from unacceptable interference caused by space radiocommunications services using non-GSO satellite systems. No similar restriction is placed on GSO satellites in the case of interference to a non-GSO system. As the Commission correctly recognizes, RR 2613 subjects non-GSO systems to unbounded regulatory uncertainty, as their operation would be vulnerable to preemption by any and all GSO satellite networks, even those deployed long after the non-GSO system. See Second NOI, at 19 and 23, n. 74. That unbounded regulatory uncertainty would prevent any non-GSO system of any significant scope from ever being deployed in bands to which RR 2613 applies. Clearly, RR 2613 places non-GSO satellite systems, including MSS feeder link

[3] The issue of co-frequency sharing among non-GSO satellite systems is complex, involving considerations of system geometry and signal design. Sharing becomes a statistical function based on the frequency and duration of interference. Generally, however, for non-GSO systems with broad coverage to accommodate advanced applications with a high degree of service quality and reliability, co-frequency sharing among systems is probably not possible and band segmentation is required.

networks, at a decided disadvantage. Second NOI, at 19

In the Second NOI, the FCC solicits comments on specific proposals for WRC-95 to modify RR 2613 to accommodate non-GSO satellite systems, including MSS feeder links, and to eliminate current ambiguity in the general application of RR 2613 to non-GSO and GSO satellite networks. Second NOI, at 23. Because the allocation of spectrum that can accommodate feeder links for the non-GSO MSS satellite systems proposed by the Big LEO applicants is critical for the introduction of these networks in the United States and throughout the world, the FCC proposes to make spectrum available for non-GSO MSS feeder links to use either exclusively or on a regulatory/procedural parity with GSO satellite systems. Second NOI, at 22.

Teledesic urges the FCC to adopt a proposal to allocate to non-GSO satellite networks sufficient spectrum in each direction in the Ka band to accommodate all proposed non-GSO satellite stations in these bands. As the Commission and the Industry Advisory Committee recognizes, attempting to accommodate GSO satellite systems and non-GSO satellite systems in the same frequency bands is highly problematic. See generally Second NOI, at 19-23. Any attempt to modify the existing order to accommodate GSO and non-GSO systems in the same way in all bands inevitably will be unsatisfactory to all concerned. The solution, therefore, is to leave the existing GSO satellite regulatory regime in place in bands where GSO satellite systems will be accorded primary status and allocate separate bands where non-GSO systems would be treated as primary. While such an approach may not be feasible in bands already congested with GSO satellite systems, it is a simple and practical solution in the higher frequencies, such as the Ka band, that are the frontier for broadband satellite systems

and remain essentially unoccupied. The FCC already has employed this approach in other portions of the radio spectrum by requiring the Big LEOs to operate their MSS service links only in non-GSO orbits. Amendment of the Commission's Rules and Policies Pertaining to a Mobile-Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 9 FCC Rcd 5936, 5945 (1994). Rather than trying to "fit a round peg in a square hole" by modifying a regulatory structure that works reasonably well for GSO satellite systems and make it equally unsatisfactory for both GSO and non-GSO satellite systems, separate allocations should be created for the two types of satellite systems within which each would be primary with its own set of rules optimized for its own distinct system characteristics. This would not preclude the possibility of sharing between GSO and non-GSO satellite systems. With some systems for some applications, sharing may be possible between the two system types. Rather, this approach would reverse, for certain bands, the primary status GSO systems currently enjoy in all bands.

C. In Order to Ensure Sufficient Spectrum for MSS Feeder Links, the Archaic FSS/MSS Service Distinction in the International Table of Allocations Should Be Eliminated for Non-GSO Satellite Systems

Conceptually, consideration of spectrum allocation issues has been confused by the distinction in the International Table of Frequency Allocations between different *service* types rather than different *system* types. Currently, regulation of the frequency bands in which any particular system can operate are dictated by the proposed service type rather than the essential characteristics of the system itself. Since all the Big LEO satellite systems have proposed to provide primarily MSS, they have become equated with that service classification. By extension, non-GSO satellite systems as a whole have been thought of synonymously with

MSS. The FSS/MSS distinction has become something of a proxy for the GSO/non-GSO satellite distinction. In fact, there is no inherent correlation between these two dichotomies. GSO satellite systems are typically equated with FSS even though GSO satellite systems can and do provide both FSS and MSS. Teledesic is a non-GSO satellite system that proposes to provide primarily FSS, although mobile applications would be enabled through the same user terminals.[4] And the Big LEOs are proposing various fixed applications for their "MSS" satellite systems. Unfortunately, this confusion between the FSS/MSS service concept and the GSO/non-GSO system concept has handicapped consideration of the regulatory changes needed to accommodate non-GSO satellite systems.[5]

There may be good reasons for maintaining the FSS/MSS distinction for GSO satellite systems -- the antennas used for mobile applications generally are less focused, requiring greater orbital arc separation between GSO satellite systems to which they would transmit. But the FSS/MSS distinction is less meaningful in the case of non-GSO satellite systems where the space segment is in motion and therefore the whole notion of orbital arc separation is irrelevant. The FSS/MSS distinction need not be abolished to accommodate non-GSO satellite systems. It, and all other aspects of the GSO order, can be maintained for GSO systems if they serve a useful purpose in that context. But another, more fundamental, distinction needs to be drawn in the international table of frequency allocations between GSO

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[4] See Teledesic System Description attached hereto as Appendix A.

[5] The FCC often equates non-GSO satellite systems with MSS. Thus, for example, in its Second NOI, the FCC mistakenly treats the inequities placed on non-GSO satellite networks by the current interpretation of RR 2613 as a problem associated with MSS. Thus, the Commission states that RR 2613 places the burden of interference avoidance primarily on the non-GSO MSS network, even where interference is the result of a later-established GSO-FSS system. Second Notice at 19. As a result of this confusion, it is not surprising that the FCC has incorrectly framed the issue in terms of the specific amount of spectrum that should be identified and allocated on a primary basis for use for non-GSO MSS feeder link use rather than for non-GSO satellite networks. Second NOI, at 23-24.

and non-GSO satellite systems.

D. Primary Non-GSO Satellite Network Allocation At WRC-95

The confusion between service and system classifications continues to complicate the consideration of the MSS feeder link issues. The international table of frequency allocations does not include a service classification called "feeder links for the MSS." Rather, non-GSO MSS feeder links are a type of FSS provided through a non-GSO satellite system.[6] Consistent with that fact, the bands that are under active consideration for use by MSS feeder links are FSS bands such as the Ka band. The reason these FSS bands cannot accommodate MSS feeder links without action at WRC-95 is that the proposed "MSS" systems are non-GSO systems and the current regulatory structure, through RR 2613, gives geostationary ("GSO") satellite systems *de facto* primary status in all bands. Spectrum is allocated in the Ka band for both FSS and MSS. Action is required at WRC-95 to accommodate the MSS feeder links not because they are MSS systems but because they are non-GSO satellite systems. As such, the current regulatory regime places the burden of interference avoidance primarily on the non-GSO system, even where interference is the result of a later-established GSO satellite system. While MSS and FSS allocations exist in the relevant bands, an allocation for non-GSO satellite networks does not. It is essential that a non-GSO satellite allocation be adopted at WRC-95 in order to accommodate all authorized and proposed non-GSO satellite systems that otherwise would be precluded from operation in the Ka band by reason of RR 2613.

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[6] The term "MSS feeder links" is a good example of the current confusion between service distinctions and system distinctions. "MSS" has become synonymous with non-GSO systems. However, the feeder link component of these systems is a type of FSS. It would be confusing, to say the least, to refer to this service as "MSS FSS." So, "MSS" becomes a proxy for "non-GSO" and "feeder links" becomes a proxy for "FSS." Because of the lack of explicit system distinctions in the current regulatory vernacular, "non-GSO FSS" becomes "MSS feeder links."

The wording of the WRC-95 agenda item for MSS feeder links does not dictate what manner of allocation is required in order to accommodate feeder links for the MSS systems. That, of course, is for the WRC to determine. The agenda item is broad and states only that the WRC should "consider allocations and regulatory aspects for feeder links for the mobile-satellite services taking account of the interference that may be caused to satellite systems in the geostationary satellite orbit." 1995 WRC Agenda. Essentially what is required and what the United States should pursue at WRC-95 is an allocation in which non-GSO satellite systems, including "MSS" systems, like the systems proposed by Motorola and TRW, would have primary status. Such action also accommodates the needs of other global non-GSO satellite systems like Teledesic. In this context, the FSS/MSS distinction is meaningless. GSO satellite systems provide MSS and FSS. "MSS" systems provide FSS. In regard to non-GSO satellite systems, there is no reason for MSS/FSS service distinctions. For example, GSO satellite systems can share the same frequencies through orbital arc separation. However, non-GSO satellites are in motion, rendering any requirement for orbital arc separation meaningless. Rather than perpetuate a service distinction without relevance to the task at hand in order to craft an *ad hoc* accommodation for only some of the non-GSO satellite systems proposed in the Ka band, a more coherent approach is to designate part of the band as primary for non-GSO systems together with appropriate coordination procedures.

At WRC-95, the FCC must advocate the allocation of spectrum for non-GSO satellite systems on a primary basis in sufficient amount to accommodate all non-GSO satellite systems proposed in the Ka band. In order to ensure the ability of all proposed non-GSO satellite systems to operate internationally, RR 2613 would not be applied to the frequencies

designated for non-GSO satellite networks in the Ka band. In addition, new GSO satellite systems would be prohibited from interfering with non-GSO satellite networks in this band and would not be entitled to claim protection from interference from non-GSO systems.

E. Non-GSO Satellite System Spectrum Requirements in Ka Band

The Industry Advisory Committee and Task Group 8/3 estimated the spectrum requirements for non-GSO MSS feeder links based on the non-GSO MSS system descriptions and service objectives. Based on these requirements, the Commission proposes that 500 MHz of spectrum (in each direction) be allocated exclusively in the 16 - 30 GHz band for MSS feeder links if sharing is not possible, and it proposes to allocate 200 MHz of spectrum (in each direction) for MSS feeder links if sharing is possible. Id. at 24. In these bands, the FCC proposes adding footnotes to the international table of allocations to ensure the primary status of feeder links for non-GSO MSS satellite systems operating in the 19.2 - 19.7 GHz and the 29.0 - 29.5 GHz bands. Second NOI, at 24-26 and Appendix 1, Recommended United States Proposals - Preliminary FCC Draft, at 12-15 ("Preliminary Draft"). Id.

Teledesic agrees with the Commission that in order to implement the non-GSO MSS systems currently proposed in the United States and elsewhere it is critical that sufficient spectrum must be identified and made available. However, Teledesic does not believe the FCC is proposing the optimal approach to secure an international allocation for MSS feeder links and believes the amount of spectrum proposed by the FCC is inadequate to accommodate all proposed non-GSO systems with MSS feeder links at the Ka band. Action is required at WRC-95 to accommodate MSS feeder links because they are non-GSO systems not because they are MSS systems. See Second NOI, at 23. Both MSS and FSS allocations

already exist at the Ka band. What does not exist at the Ka band is an allocation of spectrum for the operation of non-GSO satellite networks on a primary basis. It is critical to the deployment of global non-GSO satellite systems including systems proposed by Motorola, TRW and Teledesic that sufficient spectrum in the Ka band be allocated at WRC-95 on a primary basis for non-GSO satellite systems to accommodate the non-GSO satellite networks already proposed in the band.

Before formulating a position at WRC-95, the FCC must ascertain the spectrum requirements necessary to accommodate all non-GSO systems proposed in the Ka band. In order to determine the spectrum requirements, the FCC either should conduct its own sharing studies or should evaluate the interference analyses that have been conducted to date by proponents of satellite systems in the Ka band to determine the sharing possibilities among the systems. If the FCC does not have sufficient time to conduct these studies or if the FCC's analyses indicate that sharing is not possible, the Commission should seek the amount of spectrum at the Ka band necessary to accommodate all proposed non-GSO satellite networks. Assuming that the FCC determines that sharing between the non-GSO systems is not possible or the Commission does not have sufficient time to conduct the necessary sharing analyses, a minimum of 1,000 MHz of spectrum (in each direction) should be allocated internationally on a primary basis to non-GSO satellite systems in order to accommodate all non-GSO systems proposed at the Ka band.[7] In such a scenario, Teledesic recommends that the 18.8 - 19.8 GHz band and the 28.6 - 29.6 GHz band be allocated on a primary basis to non-GSO satellite

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[7] Motorola and TRW are seeking 200 and 300 MHz of spectrum in the Ka band (in each direction) for their MSS feeder links. Teledesic is seeking 400 MHz and 100 MHz of spectrum in the Ka band (in each direction) for its standard links (which serve as MSS feeder links) and mobile links.

networks.

If the FCC concludes that sharing between the Motorola and TRW non-GSO MSS feeder links is possible but that sharing between Teledesic and these systems is not possible, a minimum allocation of 700 MHz of spectrum (in each direction) should be sought at WRC-95 by the United States for non-GSO satellite systems on a primary basis. Under such circumstances, such a proposal is the only means by which all United States global satellite systems proposing to use Ka band spectrum for MSS feeder links can be accommodated. If, on the other hand, the FCC ultimately concludes that all three non-GSO systems can share with each other in the Ka band, then the United States should reduce its minimum Ka band spectrum allocation request to 500 MHz (in each direction) for non-GSO satellite networks.

Teledesic has conducted extensive analyses of the feasibility of co-directional frequency sharing between various non-GSO MSS networks, and also between non-GSO networks and GSO satellite networks proposed in the Ka band. See Appendies B and C. For example, Teledesic has evaluated the level of interference between its three types of service links and Motorola's proposed MSS feeder links. See Appendix B. Teledesic has three types of links with the following requirements (in each direction) -- standard link: 400 MHz; mobile link: 100 MHz; and high-data-rate link: 800 MHz. The standard link and the high-data-rate link can be considered both as MSS feeder links and FSS links. The mobile link provides MSS.[8] The results of the Teledesic analysis indicate that the probability of interference between Teledesic's high-data-rate links and Motorola's feeder links is very small and sharing

[8] Teledesic's proposed spectrum requirements for Ka band operation of its global broadband non-GSO satellite network are set forth in Appendix D hereto and are being incorporated herein by reference.

is possible. Id. The interference can be virtually eliminated by establishing minimum site separation requirements between Teledesic's high-data-rate earth station and Motorola's MSS feeder link earth station. Id.

According to Teledesic's study, the level of interference between Teledesic's mobile links and Motorola's MSS feeder links appears high, and Teledesic does not believe sharing between its mobile links and Motorola's feeder links is likely. Id. Although site separation between Teledesic's mobile earth stations and Motorola's earth station reduces the occurrence of interference events, it is not likely that Teledesic's mobile terminals will be able to be deployed with such operational restrictions given their ubiquitous nature. Id. The interference from Motorola's MSS feeder links into Teledesic's standard links is not severe. Id. On the other hand, the interference from Teledesic's standard links into Motorola's MSS feeder links is more severe. Id. The occurrence of interference in this latter case can be reduced by the imposition of site separation restrictions. Id. However, because of the large Motorola satellite antenna foot prints, the occurrence of interference cannot be reduced significantly as the site separation distance increases. Id. The possibility of sharing between Teledesic's standard links and Motorola's feeder links depends on the level of interference that Motorola's feeder links can tolerate. Id. It is not clear whether sharing between Teledesic's standard links and Motorola's MSS feeder links is possible because Motorola has not defined the level of interference it can tolerate. Id.

Sharing studies between non-GSO satellite systems and GSO networks also must be conducted before the FCC can determine the specific spectrum requirements for non-GSO satellite networks. For example, Teledesic also has conducted an interference analysis

between its three different links and the service links of the GSO satellite system in the Ka band proposed by Hughes Communications Galaxy, Inc. See Appendix C. The analysis indicates that the interference between Teledesic's high data rate links and Hughes' links is not very severe when the earth stations of the two networks are located at high latitudes. Id. At low latitudes, the interference between Teledesic's high rate links and Hughes' links increases, and some site separation may be necessary to reduce the interference. Id. Accordingly, it appears that Teledesic's high data rate links can share with the Hughes system. Id. However, the interference between Teledesic's standard and mobile links and Hughes' links is severe, and sharing between these links does not seem feasible. Id.

Other interference analyses of co-frequency sharing among non-GSO satellite networks at the Ka band also have been conducted. The minimum spectrum requirements at the Ka band for United States non-GSO satellite systems are wholly dependent on the ability of the proposed satellite systems to engage in co-frequency sharing. Further analyses are required before the FCC can determine the minimum spectrum requirements necessary to accommodate all of the non-GSO satellite systems with spectrum needs at the Ka band.

F. Proposed Regulatory Approach for Non-GSO Satellite Network Allocation at Ka Band

The allocation at WRC-95 of spectrum for primary use by all non-GSO satellite systems proposed in the Ka band is imperative. A simple, practical means of accomplishing this result is through footnote language that states that non-GSO satellite networks have primary status, and GSO satellite networks have secondary status in the specified frequency bands. In addition, RR 2613 would not apply to the frequencies designated for non-GSO satellite networks in the Ka band and some coordination procedures would need to be

specified. Resolution 46, applicable to MSS systems in the lower frequency bands, might provide a useful model. This approach will ensure regulatory certainty for non-GSO satellite systems as well as GSO satellite systems, and will eliminate the artificial regulatory disadvantage facing non-GSO satellite networks given the current interpretation of RR 2613.

Teledesic recommends adoption of the following footnote language to accomplish these objectives:

ADD 872A The frequencies in the band [ZZ.Z] GHz are primarily for use by Non-GSO networks in the space-to-Earth direction. Such use is subject to the application of the coordination and notification procedures set forth in Resolution 46. The provisions of RR 2613 do not apply. Stations of GSO fixed satellite service networks brought into use in the band [ZZ.Z] GHz after November xx, 1995 shall not claim protection from and shall not cause harmful interference to Non-GSO networks in this band.

ADD 882H The frequencies in the band [YY.Y] GHz are primarily for use by Non-GSO networks in the Earth-to-space direction. Such use is subject to the application of the coordination and notification procedures set forth in Resolution 46. The provisions of RR 2613 do not apply. Stations of GSO fixed satellite service networks brought into use in the band [YY.Y] GHz after November xx, 1995 shall not claim protection from and shall not cause harmful interference to Non-GSO networks in this band.

III. WRC-97 WILL BE TOO LATE TO ESTABLISH A PRIMARY ALLOCATION OF SPECTRUM FOR NON-GSO SATELLITE NETWORKS

The regulatory approach adopted at WRC-95 for allocating spectrum for MSS feeder links must anticipate the need to accommodate non-GSO satellite systems in a more comprehensive fashion while the Ka band remains largely unoccupied. If sufficient spectrum at the Ka band is not allocated at WRC-95 on a primary basis to non-GSO satellite networks to accommodate the requirements of Teledesic and the MSS feeder links of the other non-GSO satellite systems proposed there, such an allocation may never be possible. The random deployment of GSO satellite networks between now and WRC-97 may effectively preclude

the ability of the United States at future WRCs to establish an adequate allocation of spectrum at the Ka band on a primary basis for non-GSO satellite networks.

To date, 149 Ka band GSO satellites are shown in the ITU Space Network List as being advanced published, under coordination or notified.[9] To date, 45 out of the 149 Ka band GSO satellites shown in the ITU Space Network List have reached the notification stage and either have been deployed or will likely be deployed soon. Teledesic understands that by the end of 1997 four GSO satellites presently notified to the ITU will be brought into service. The satellites are INTALSAT F2 and NSTAR in 1995, and COMET and ARTEMIS in 1997. Based on the foregoing, it is essential that the United States advance a proposal at WRC-95 to consider an allocation of spectrum for non-GSO satellite networks at the Ka band to accommodate MSS feeder links and other non-GSO satellite uses. To ignore this issue at WRC-95 may forever preempt consideration of such an allocation in the Ka band, absent a standstill agreement, given the predicted deployment of GSO satellite networks throughout the Ka band between now and the conclusion of WRC-97.

IV. PROPOSED WRC-97 AGENDA ITEM

The FCC also solicits comment on the issues that should be considered at WRC-97. Second NOI, at 48. As indicated above, it is crucial that the United States obtain action at WRC-95 to designate spectrum on a primary basis for non-GSO satellite networks at the Ka band in a sufficient amount to accommodate all proposed non-GSO satellite networks. Otherwise, it may never be possible to secure such an allocation at the Ka band. If, despite the United States' best efforts, such a non-GSO allocation is not accomplished at WRC-95 or

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[9] These satellites have been proposed by Australia, Belgium, the European Space Administration, France, Germany, Italy, Japan, NOTELSAT, Russia, the United Kingdom, the United States, and the former Soviet Union.